



Efficiency and Sustainability in the Energy and Chemical Industries

Jakob de Swaan Arons, Hedzer van der Kooi and Krishnan Sankaranarayanan, Marcel Dekker, New York, NY, 300 pp., \$165.00, 2004



Business, governments and non-governmental organizations are increasingly discussing sustainability, a broad topic with far ranging implications, but one that is difficult to define crisply. Sustainability practitioners share a somewhat common view of the new world order, but defining the changes needed, the paths to pursue, and the ultimate goal — assuming there is a defined end-point — is challenging. This is particularly the case where, as this reviewer feels, the “rubber meets the road” in sustainability — changing technology approaches to how we undertake chemical and physical transformations to make the goods needed by our worldwide society and how we deliver them in the ever-growing economy necessary to improve the quality of life in developing nations.

This transformation requires developing a set of tools that engineers and chemists can add to their traditional toolbox to evaluate new processing paradigms within the framework of sustainability. In this context, energy consumption and the state of the environment are closely linked and improving the energy intensity of a process is a worthy goal. This book grew out of the authors’ teachings of advanced thermodynamics to process technologists of Akzo Nobel and their requests for exergy analysis of processes. Lessons from this industrial experience were built into courses for chemical engineering students at Delft during which the authors became more cog-

nizant of the role of the second law of thermodynamics in everyday life and the engineering value of understanding the thermodynamics of reversible processes.

The first section of the book is a refresher course in thermodynamics (chapter 2), energy consumption and lost work (chapter 3), and cause and effect of entropy generation (chapter 4). Chapter 5 explores the relationship between lost work and the driving forces and fluxes associated with a process that establish practical limits to minimizing lost work and entropy generation.

Chapters 9, 10 and 11 apply exergy analysis to a number of examples of different power generation technologies, separations as exemplified by the separation of propane and propylene by distillation, and chemical conversions (two industrial polymer processes), respectively.

The book contains short chapters on lifecycle analysis, sustainable development, green chemistry, solar power, and biomass production and conversion. These chapters are useful primers for those interested in sustainability and contain a number of valuable references for those wishing to explore these areas more fully. A chapter on economics, ecology and thermodynamics looks at the role of ecology in economic models and theories.

The book concludes with the authors’ views of future trends in the energy and chemical businesses. The section on energy contains some valuable comments on the challenges of the hydrogen economy, while that on the chemical industry notes the desirability of moving to renewable raw materials and opines on the hurdles the authors see to achieving this goal that are imposed by the standard financial analysis approaches businesses currently use.

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Managing Maintenance Shutdowns and Outages

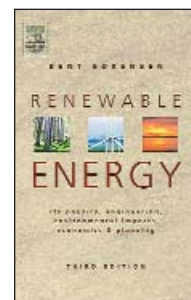
Joel Levitt, Industrial Press, Inc., New York, NY, 208 pp., \$145.00, 2004



Written by a leading trainer of maintenance professionals, this book organizes the details of a maintenance shutdown into a manageable form by introducing all the steps needed for a successful shutdown or outage. It includes detailed steps for each phase (initiation, planning, execution, closeout, lessons learned), massive master lists of everything that must be done for each phase of shutdown, and numerous checklists that can be immediately put to use. Loaded with examples from many industries and actual events, this book is a practical guide for maintenance managers, project engineers, supervisors, maintenance engineers, and planners working in any heavy maintenance environment.

Renewable Energy, Third Edition

Bent Sorenson, Elsevier Academic Press, Burlington, MA, 928 pp., \$84.95, 2004



The author first describes the effect of the sun on the atmosphere and the creation of wind and waves, including the effects of global warming. For each type of renewable energy, from direct solar radiation to wind and biomass, there follows a technical description of the devices that can be used to transform the energy into useful forms. The author explores new solar cell types, including polymer and organic cells, new biofuel processes and new wave energy devices. The final part of the book looks at social and economic aspects of renewable energy. The book is ideal for undergraduates and graduates in earth sciences, environmental sciences, and engineering, as well as researchers and consultants.